Center Independent Research & Development: GSFC IRAD

Radiation Evaluation and Concept Development for Analog Probability Processing Technology Project

Completed Technology Project (2011 - 2013)

Project Introduction

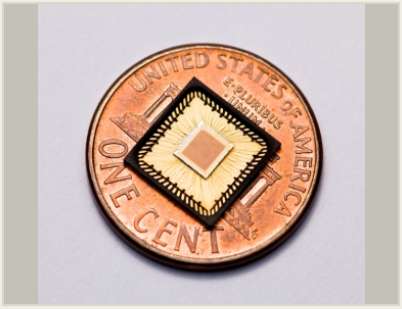
Analog probability processing technology has the ability to provide game-changing performance advances and power savings for on-board data processing applications. Evaluate space environment radiation performance of Analog Devices Lyric Labs' analog probability processing technology. Develop preliminary architecture concepts for demonstration experiments using pre-existing designs, such as forward error correction or fast Fourier transform application-specific integrated circuits (ASICs). The collaboration with Analog Devices Lyric Labs was enabled via interactions with the Defense Advanced Research Projects Agency (DARPA). Analog Devices Lyric Labs was formerly Lyric Semiconductor before being acquired by Analog Devices, Inc. in the summer of 2011.

We will perform lab bench evaluations using Analog Devices Lyric Labs evaluation hardware as well as the NASA/GSFC Radiation Effects and Analysis Group field-programmable gate array (FPGA)-based low-cost digital tester. The evaluation hardware will be used to inform spaceflight hardware design decisions. The Analog Devices Lyric Labs probability processing technologies are fabricated in commonly-available commercial complementary metal oxide semiconductor (CMOS) processes. Part of this project will also be to interface with other technology developers and scientists, both inside and outside of NASA/GSFC. Analog probability processing is enough of a paradigm shift that the end-user applications may not be known a priori and may either be based on insertion into pre-existing functions or development of new capabilities that could not be realized with existing hardware. The probability processing hardware utilized for this project is the property of Analog Devices Lyric Labs and was developed under a Defense Advanced Research Projects Agency (DARPA) contract. There is currently follow-on work at DARPA under the Unconventional Processing of Signals for Intelligent Data Exploitation (UPSIDE) program.

Anticipated Benefits

This technology development has performance benefit implications for next-generation spatial navigation and image processing missions.

This work provided benefits to several Department of Defense component agencies.



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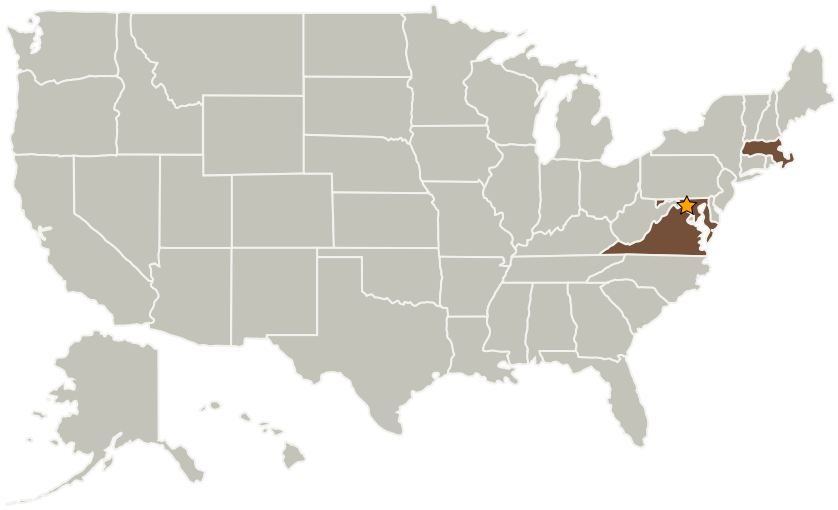


Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
Analog Devices	Supporting Organization	Industry	

Co-Funding Partners	Type	Location
Air Force(USAF)	US Government	Washington, District of Columbia
Defense Advanced Research Projects Agency(DARPA)	US Government	
Defense Threat Reduction Agency	US Government	
Lyric Semiconductor	Industry	

Organizational Responsibility

Responsible Mission Directorate:

Mission Support Directorate (MSD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Center Independent Research & Development: GSFC IRAD

Project Management

Program Manager:

Peter M Hughes

Project Manager:

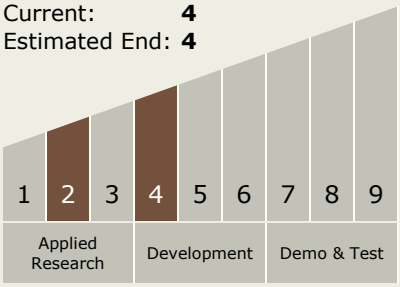
Wesley A Powell

Principal Investigator:

Jonathan A Pellish

Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



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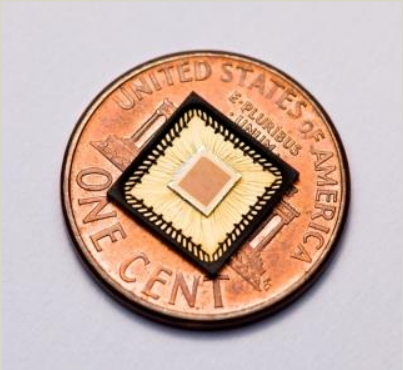
Primary U.S. Work Locations	
Maryland	Massachusetts
Virginia	

Images



Radiation Evaluation and Concept Development for Analog Probability Processing Technology Project
Radiation Evaluation and Concept Development for Analog Probability Processing Technology Project *(https://techport.nasa.gov/image/3028)*

Project Website:

http://aetd.gsfc.nasa.gov/

Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.2 Extravehicular Activity Systems
    - TX06.2.3 Informatics and Decision Support Systems